Threatened Species Assessment

Carex archeri
Archer's Sedge

Taxonomy

Carex archeri Boott

The inflorescence is a single spike as in *C. capillacea* and *C. cephalotes*. It differs from both species in having the lowest involucral bract exceeding the inflorescence. From *C. capillacea* it differs further in the male part of the spike being shorter than the female part, and from *C. capillacea* it differs further in having shorter spikes, and fewer female flowers (VicFlora, 2018).

Current conservation status

Categorised as Vulnerable in the 2014 Advisory list of rare or threatened flora (DEPI 2014).

Proposed conservation status

Endangered in Victoria

Criteria B1ab(iii)+2ab(iii)

Species Information

Description and Life History

The taxon is a perennial herb with a long rhizome; shoots ± loosely tufted. Culms erect, slender, terete, smooth, 3-25 cm long, c. 0.5 mm diam. Leaves usually shorter than culms, 0.3-0.5 mm wide; sheath dark yellow-brown; ligule truncate to rounded. Inflorescence erect, 0.5-0.7 cm long, with 1 few-flowered spike; lowest involucral bract exceeding inflorescence. Spike short, with very short portion of male flowers above the few (3-6) female flowers; glumes obtuse to acute, red-brown with narrow hyaline margins; female glumes 2.5-4(-5) mm long; utricles stipitate, 3-5 mm long, c. 1 mm diam., ellipsoid to ovoid, ± falcate, nerveless or faintly nerved, glabrous or hispidulous on upper margins, red-brown to dark red-brown; beak 1-2.5 mm long, with apex notched; style 3-fid. Nut narrow-ellipsoid, trigonous, pale yellow-brown. The taxon flowers in summer (VicFlora, 2018).

Generation Length

The generation length of *Carex archeri* is estimated to be 50 to 200 (midpoint 150) years. The taxon has long creeping rhizomes, potentially running and resprouting indefinitely. Whilst some seed-based recruitment may occur between fires, it is assumed that vegetative resprouting is likely to be more important than seed-based recruitment for population maintenance under pre-settlement conditions. The pre-settlement fire interval was probably in the 50-100 year range, with fire affecting only a mosaic proportion of plants at any one site. Generational turnover is therefore likely to take at least several fire intervals, potentially in the range of 150-200 years or more, unless interrupted by extreme stochastic events. Seed-based recruitment is likely to be opportunistic in response to localised site disturbance events and seasonal conditions.

Distribution

The taxon is scattered and apparently rare in Victoria where it is restricted to the higher alpine areas (e.g., Mts Hotham, Feathertop and Bogong), with isolated occurrences on the Snowy Range and near Cravensville. The taxon has been very seldom collected since 1950. It also occurs in New South Wales and Tasmania (VicFlora, 2018).

Habitat

The taxon is a habitat specialist restricted to wet, sheltered and typically rocky sites such as amongst wet rocks along creeks, cliff faces near waterfalls where growing out of deep moss curtains on steep wet rock faces, on ledges in the spray zone of cascades and beside small waterfalls on creeks. Recorded elevations include 1320 metres, 1500 metres, 1540 metres, and 1580 metres. Associated species include *Blechnum penna-marina*, *Cystopteris tasmanica*, *Isolepis subtillissima* and *Poa fawcetiae*.

Threats

The taxon is highly susceptible to climatic drying and any disruption to the hydrology of its highly specific habitat. The impact of climatic drying is exacerbated by the risk of shrub and tree invasion of upstream grassy or herb-rich habitats in response to increasing fire risk.

The bushfires of 2019/2020 are believed to have impacted around 3% of the taxon's habitat. The overall impacts of the fire are yet to be determined, and its recovery depends on the effective control of the impacts of feral herbivores and prevention of major soil and vegetation disturbance as a result of fire recovery activities.

IUCN Criteria

Criterion A. Population size reduction.
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(*a) cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Ineligible under Criterion A

There is insufficient evidence to determine whether there has been or will be a reduction in population sufficient to meet any threshold for Criterion A.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion B1 as Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 707 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented naturally at the subregional and landscape scales with all geographically isolated stands occurring at separations likely to greatly exceed the dispersal range of the taxon, which has no specialised mechanism for long-distance dispersal. Seed-bearing utricles are likely to be dispersed downstream by water within each catchment unit.

It is estimated to have 1 location. It has a continuing decline in (iii) above, based on the current and projected impact of the identified threats.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 28 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is estimated to be severely fragmented to have 1 location and has a continuing decline in (iii) above.

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Ineligible under Criterion C as Data Deficient

No reliable estimate of total population size for the taxon is available.

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	< 50	< 250	< 1,000
D2 Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2. Typically: AoO < 20 km2 or number of locations ≤ 5

Evidence:

Eligible under criterion D2 as Vulnerable

The taxon is estimated to be very restricted.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

DEPI (2014) *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne. Retrieved from: https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/50448/Advisory-List-of-Rare-or-Threatened-Plants-in-Victoria-2014.pdf

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens: *Carex archeri*.. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/786e6cbe-c65e-49fb-9e24-889c084565d5